

ARCO Alaska, Inc.
Post Office Box 100360
Anchorage, Alaska 99510-0360
Telephone 907 276 1215



May 25, 1989

Mr. Leonard Verrelli, Chief
Air Quality Management
Division of Environmental Quality
Alaska Department of Environmental Conservation
P.O. Box O
Juneau, Alaska 99811-1800

RECEIVED
AUG 11 1989

AOO-JUNEAU

Dear Mr. Verrelli:

RE: Prevention of Significant Deterioration Permit for Prudhoe Bay Flow Station 2;
Responses to incompleteness

In your April 27, 1989 letter, you identified several items that needed to be provided before you could determine that the captioned permit application was complete. The following addresses those issues, in the order they were identified in your correspondence.

1. Emission data for the proposed Solar Turbines

a. Manufacturer's estimated nominal and guaranteed emission rates and exhaust volume concentrations, in pounds per hour and parts per million of each regulated air contaminant at base load and peak load, based on the type of fuel burned.

RESPONSE: The following information has been obtained from the vendor on the Solar Centaur turbines. Although you have requested base and peak load conditions, the proposed turbines will be in a continuous, steady-state driver applications, and thus will not have base/peak loads. The emissions guarantees according to the vendor are the nominal value plus the percent margin, and are shown below.

Pollutant	Turbine Performance	
	Emission Rate @ 59°F	
NO _x	Nominal	Guarantee
	15.24 lb/hr	18.29 lb/hr
	78.46 ppmv	94 ppmv
CO	0.65 lb/hr	1.95 lb/hr
	5.54 ppmv	16.6 ppmv
UHC	0.26 lb/hr	1.3 lb/hr
	3.77 ppmv	18.85 ppmv
SO ₂	dependent on sulfur content of fuel	
	0.14 lb/hr @ 25 ppm H ₂ S in fuel gas	

Mr. Verrelli
May 25, 1989
Page 2

b. Heat rate in kilojoules per kilowatt-hour or BTU per horsepower-hour

RESPONSE: The heat rate as obtained from the vendor is:

	Site Rated	Normal	Max	Min
BTU per hp-hr	8965	8916	9369	8673

2. Documentation to establish the current actual emissions from Flow Station 2

Established by: b. show what the maximum emissions of the sources actually installed at Flow Station 2 would be based on the emission limits specified in the current permit. Indicate any source which has replaced a source described in the original permit, and include a modeling analysis showing the ambient impact of the actual facility compared with that previously predicted.

*used allowable
emission rate*

RESPONSE: Research into the historical references to previous FS 2 air permit source inventories, shows that there have been different characterizations for the sources at FS-2 over time. Although differences in the descriptions of the sources do occur, none of the sources have changed since they were installed. It should be noted, as well, that all air modeling studies that have been conducted using FS-2 sources have used the descriptions as they appear in the most recent model work included in the March 28, 1989 FS-2 PSD permit application. No sources have been replaced. The differences seen in comparisons with earlier information only indicate a difference in interpretation of what kind of information is needed: i.e. maximum rating, nominal rating, rating at 40 °F, ISO rating, heat output, or heat input. These different bases will, of course change how a particular source is identified. The following shows only three source inventories from previous permits:

all modeling using this eqpt list.

Flow Station 2 Emission Sources

Table 1-1 from FS 2 PSD Permit Modification, March 1989

- 2 - 35,000 HP gas-fired turbines
- 2 - 14,000 HP gas-fired turbines
- 5 - 5,000 HP gas-fired turbines
- 2 - 21.0 MMBtu/hr heaters
- 2 - 28.4 MMBtu/hr heaters
- 2 - 2.0 MMBtu/hr heaters
- 1 - Flare

ISO

Mr. Verrelli
May 25, 1989
Page 3

Exhibit A-2, Permit 8736-AA010 (April 22, 1987)

- 2 - 31.5 MHP gas-fired turbines
- 2 - 12.5 MHP gas-fired turbines
- 3 - 4.9 MHP gas-fired turbines
- 2 - 3.9 MHP gas-fired turbines
- 2 - 26.1 MMBtu/hr heaters
- 2 - 19.8 MMBtu/hr heaters
- 2 - 4.1 MMBtu/hr heaters
- 1 - 2100 HP Emergency power generator
- 1 - 3600 HP emergency power generator

Flares

Exhibit C, Permit 8536-AA010 (June 1985)

- 2 - 32,500 HP gas fired turbines (@40 ° F)
- 2 - 15,700 HP gas-fired turbines (@40 ° F)
- 3 - 4,900 HP gas-fired turbines (@40 ° F)
- 2 - 4,250 HP gas-fired turbines (@40 ° F)
- 2 - 26.1 MMBtu/hr heaters
- 2 - 19.8 MMBtu/hr heaters
- 2 - 4.1 MMBtu/hr heaters
- 1 - 2110 HP emergency power generator
- 1 - 3600 HP emergency power generator

Flares

Comparing the historical information shows:

- 1) The two (2) 35,000 hp turbines descriptions have ranged from 31,500 hp to 36,000 hp.
- 2) The two (2) 14,000 hp turbines descriptions have ranged from 12,500 to 15,700 hp.
- 3) The five (5) 5000 hp turbines descriptions have ranged from 5-5000 hp to 3-4900 hp and 2-4250 hp or 2-3900 hp.
- 4) The two (2) 28.4 MMBtu/hr heaters descriptions have ranged from 26.1 MMBtu/hr to 28.4 MMBtu/hr.
- 5) The two (2) 21.0 MMBtu/hr heaters descriptions have ranged from 19.8 MMBtu/hr to 21.0 MMBtu/hr.
- 6) The two (2) 2.0 MMBtu/hr heaters descriptions have ranged from 2.0 MMBtu/hr to 4.1 MMBtu/hr.

Mr. Verrelli
 May 25, 1989
 Page 4

The emission limits specified in the current permit are:

Equipment Type	Pollutant	Emission Limitation
Turbines:	NO _x	150 (14.4/Y) ppm
Turbines	CO	109 lb/10 ⁶ scf of fuel
Heaters (less than 43 MMBtu/hr)	NO _x	0.10 lb/10 ⁶ Btu

The maximum emissions limits of the sources actually installed at FS-2 are:

Equipment type	Pollutant	Limit	
35,000 hp turbine	NO _x	150 ppm	NPS unadjusted
	CO	40 lb/hr	BACT
14,000 hp turbine	NO _x	150 ppm	
	CO	16 lb/hr	
5000 hp turbine	NO _x	150 ppm	
	CO	6 lb/hr	
28.4 MMBtu/hr heater	NO _x	2.61 lb/hr	
21.0 MMBtu/hr heater	NO _x	1.98 lb/hr	
2.0 MMBtu/hr heater	NO _x	0.41 lb/hr	

The emissions used for the turbines reflect the concentration of air contaminant based on the permit limitations for turbines. The emission strengths used for the heaters are calculated based on the permit limitations for heaters.

The modeling that was done for the March 1989 FS-2 permit modification examined the existing sources' ambient air impacts first, and the change that is predicted to take place by the addition of the three new sources. The modeling results we have presented in the 1989 permit modification are better comparisons than using previous model results. Comparisons to previous model results would not be very fruitful, since significant changes in the model have been made since the earlier predictions in 1983. These changes have resulted in more accurate predictions of ground level impacts. We have performed the model analysis which shows the ambient air impact of the actual facility sources. We have used the more recent model results to make comparisons with proposed changes, and believe this comparison is responsive to your request under this item. Please let us know if further analysis is warranted.

3. Fuel quality

maximum, minimum, and average heat content; and hydrogen sulfide content

RESPONSE: Fuel gas data have been reviewed from May 1987 to current date. That data has been summarized as follows:

Heat content of fuel gas(at 60° F, 14.7 psia):

Maximum: 962.28 gross dry Btu/scf

Minimum: 952.91 gross dry Btu/scf

Average: 956.33 gross dry Btu/scf

Sulfur content of fuel gas:

Maximum: 11 ppmv

Minimum: 4 ppmv

Average: 7.5 ppmv

4. Documentation

references: NO_x Control Technology for Natural Gas-fired Turbines by S.F. Jelinek and M. Gregory, ENSR; and Thermal DE-NO_x and SCR Operational Developments by J. Steiner.

RESPONSE: References are enclosed for your information.

5. Modeling

a. Provide comparison between Pad A data and five years of Deadhorse meteorological data to ensure that selected data is representative.

RESPONSE: We do not have in our possession, nor in the possession of the consultant, ENSR, a 5-year database from the Deadhorse airport from which to make the comparison requested by ADEC. These data are also not available from the National Climatic Data Center (NCDC) in Asheville, North Carolina. We understand that ADEC does not have this database either. We will make contacts with local personnel in Anchorage, specifically Alaska Environmental Information Data Center, in an attempt to secure such data. However, it may take some time to obtain these data. We will attempt to make whatever comparisons are possible with existing data to respond with this request. We ask the agency reviewers not to delay the permit process, and to continue review of the permit application while we attempt to gather the data for comparison.

b. Identify the boundary of the significant air quality impact from the new sources.

RESPONSE: ENSR has run the ISC model for the new Solar turbines only, on the regional receptor grid. The 1 ug/m³ annual mean isopleth, which defines the significant impact zone for NO_x emissions, is shown in the enclosed figure.

Mr. Verrelli
May 25, 1989
Page 6

c. Clarification of the number of sources used in the modeling. Model runs indicate 54 sources, while the PBU inventory shows 74.

RESPONSE: All 74 sources listed in the application were included in the cumulative modeling analysis. The model run shows only 54 sources because identical units at some facilities were combined. How these sources were combined is indicated on the attached spreadsheet. Please note that the computer run includes two small sources at Drill Site #1 that were later determined to be non-existent. However, the consultant did not rerun the model with these corrections because, according to ENSR, the results as presented in the application would not be substantially changed by eliminating these small sources.

Miscellaneous

a. Table E-2 refers to Table B-1 Where is this table?

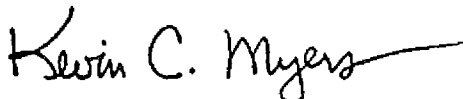
RESPONSE: Reference to Table B-1 should have read Table E-1, and is included in the text.

b. Include a qualitative description of the impact, or lack of impact on the Class I increments and visibility at Denali Park, and its integral vistas.

RESPONSE: This description was included in Section 5, page 5-1 first paragraph. Here, we concluded that due to the long transport distances (700 km) and the fact that trajectories to Denali must cross the Brooks Mountain Range, no coherent plumes from the PBU could reach the park to impair visibility. For the same reason, impacts to PSD increments from the small increase in NO_x attributable to the FS-2 modification should also be negligible. Please inform us if this is still not responsive to your request.

We have responded to the issues raised in your correspondence of the March 1989 FS-2 permit application. We understand that this will allow for you to continue to process the application. If you have further questions, please do not hesitate to contact me.

Sincerely,



Kevin C. Myers
Manager, Permits and Compliance,
Prudhoe Bay/Lisburne

Enclosures
gsr/kcm